

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2017/2018

DCT5038 – DATA COMMUNICATIONS AND NETWORKING (DIT & DBIS)

1 JUNE 2018
9:00 a.m. – 11:00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT:

1. This question paper consists of **THREE (3)** pages.
2. There are **FIVE (5)** structured questions in this paper. Each question carries total of **20 Marks**.
3. Answer **ALL** questions in the **Answer Booklet** provided.

Structured Questions [100 marks]

Instruction: Write your answers in the Answer Booklet.

Question 1

- a) Draw and briefly explain for the following types of data flow.
- Simplex mode
 - Half-Duplex mode
 - Full-Duplex mode
- (9 marks)
- b) Differentiate between analog signals and digital signals.
- (4 marks)
- c) A signal travels from point A to point B. At point A, the signal power is 100W. At point B, its power is reduced to half. What is the attenuation in decibel?
- (2 marks)
- d) Calculate the transmission time for a 30 kbyte message if the bandwidth of the network is 1 Mbps. Assume that the distance between the sender and the receiver is 8500 km and that light travels at $4 \times 10^8 \text{ m/s}$, what is the propagation time? Write your answer in milliseconds (ms).
- (5 marks)

[TOTAL 20 MARKS]

Question 2

- a) *Figure 1* shows a Return to Zero (RZ) encoding for a digital transmission system.

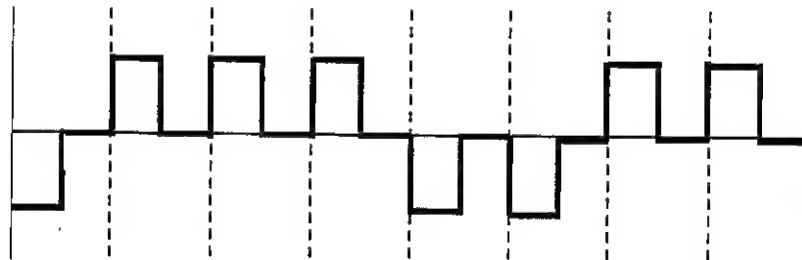


Figure 1

- Determine the data stream for RZ encoding in *Figure 1*. (2 marks)
 - Convert the RZ encoding into Manchester encoding. (4 marks)
- b) Using Nyquist theorem, calculate the sampling rate for a signal with a bandwidth of 8000Hz (4000Hz to 12,000Hz).
- (2 marks)

Continued...

- c) Differentiate between parallel transmission and serial transmission. (2 marks)
- d) A 8-PSK is used in a digital-to-analog conversion process.
- i. Calculate the number of bits require for one baud? (2 marks)
 - ii. Draw the constellation diagram for 8-PSK. (4 marks)
 - iii. If the bit rate is 7200 bps, what is the baud rate? (2 marks)
 - iv. State the difference between bit rate and baud rate. (2 marks)

[TOTAL 20 MARKS]

Question 3

- a) Given the following information, find the maximum bandwidth for each signal source. Write your answer in kHz.
- FDM multiplexing
 - Total available bandwidth = 7.9 kHz
 - Three signal sources
 - A 200-Hz guard band between each signal source
- (3 marks)
- b) What is Wave-division Multiplexing (WDM)? Give **ONE** application of WDM. (2 marks)
- c) Given the following information, draw the TDM frames showing the character data.
- Four signal sources:
- Source 1 message: T E G
 - Source 2 message: F
 - Source 3 message:
 - Source 4 message: E J I K
- (5 marks)
- d) Briefly explain **TWO** modes of transmission in fiber-optic cable. (4 marks)
- e) State the difference between radio waves and microwaves in terms of frequency, direction and bandwidth. (6 marks)

[TOTAL 20 MARKS]

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Question 4

- a) Given a dataword 10110100 and the divisor 1101. By using CRC error detection method, show the generation of the codeword to be transmitted at sender site.
(6 marks)
- b) Given a bit stream of 10101101 00110110, identify the checksum that will be send by the sender. Check your answer to determine whether the received pattern has no error.
(5 marks)
- c) Define Automatic Repeat Request (ARQ) and list **THREE** types of ARQ.
(5 marks)
- d) Draw the Stop-and-Wait ARQ diagram to illustrate the situation when the frame is lost.
(4 marks)

[TOTAL 20 MARKS]**Question 5**

- a) Explain how Carrier Sense Multiple Access (CSMA) nonpersistent strategy can solve the problem if the channel is busy.
(3 marks)
- b) List **ONE** advantage and **ONE** disadvantage of using Carrier Sense Multiple Access (CSMA) nonpersistent strategy.
(2 marks)
- c) Token-passing is one of the popular controlled-access methods. Draw **TWO** types of the diagram of token-passing access method.
(5 marks)
- d) Packet-switched network can use two different approaches to route the packets: datagram approach and virtual circuit approach. Give **TWO** characteristics for each type of the approaches.
(4 marks)
- e) For communication in virtual circuit switching, a source and destination need to go through three phases. List and briefly explain the **THREE** phases.
(6 marks)

[TOTAL 20 MARKS]**End of Page.**